REMARKS

Claims 32-56 are pending in the application with claims 32, 33, 36, 37, 40, 41, 45, 46, and 50-52 amended herein.

Claims 32-35, 40-51, 53, 55, and 56 are withdrawn from consideration as being directed to a non-elected invention. Applicant traverses on the grounds that the previously-pending claims are generic to the withdrawn claims and that page 2 of the Office Action mischaracterizes the previously claimed inventions. Previous to the Response to June 4, 2004 Office Action, claim 32 set forth an atomic layer deposited insulative barrier layer to oxygen diffusion between first and second electrodes. The capacitor dielectric layer was over the first electrode and a second electrode was over the dielectric layer. Subsequently, Applicant amended claim 32 to set forth that the barrier layer is between the first electrode and the dielectric layer and/or between the dielectric layer and the second electrode. Thus, in subsequent claim 32, the barrier layer is still set forth as between the first and second electrodes, but its position between the electrodes with respect to the dielectric layer is specified. Accordingly, every limitation of subsequent claim 32 is expressly encompassed within the scope of previous claim 32. Previous claim 32 is thus generic to subsequent claim 32.

Page 2 of the Office Action erroneously states that previous claim 32 set forth "a single" barrier layer. The Office's characterization of previous claim 32 adds a claim limitation not present in such claim. Previous claim 32 (and subsequent claim 32) set forth "an atomic layer deposited insulative barrier layer." Proper interpretation of claim 32 according to well-established

patent law dictates that "a barrier layer" should be interpreted to include both a single barrier layer as well as multiple barrier layers unless otherwise indicated in the specification. As may be appreciated from page 10, lines 6-13 and elsewhere throughout the present specification, the specification does not indicate "a barrier layer" to mean "a single barrier layer."

As such, previous claim 32 clearly encompassed the full scope of subsequent claim 32, setting forth a barrier layer between the first electrode and the dielectric layer, between the dielectric layer and the second electrode, or both. At least for such reasons, Applicant's constructive election by original presentation of previous claim 32 clearly included the inventions set forth in subsequent claim 32 and, by withdrawing subsequent claim 32, the Office has denied Applicant the examination of constructively elected subject matter. At least for the reasons set forth herein with regard to claim 32, Applicant asserts that previous claims 40 and 45 are also generic to subsequent claims 40 and 45. Applicant requests consideration of claims 32-35, 40-51, 53, 55, and 56 in the next Office Action.

Claims 36-39, 52, and 54 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi and Kim. Applicants request reconsideration.

Amended claim 36 sets forth a capacitor construction that includes, among other features, a first capacitor electrode, an insulative barrier layer to oxygen diffusion over the first electrode, a capacitor dielectric layer over the barrier layer or between the first electrode and the barrier layer, and a second capacitor electrode over the dielectric layer and the barrier layer. The barrier

layer includes a chemisorption product of first and second substantially saturated precursor monolayers and has a thickness of less than 10 Angstroms. The dielectric layer and/or the second electrode contain oxygen that is diffusable into the first electrode absent the barrier layer. At least page 11, lines 3-19 support the claim 36 amendment. The Office Action relies on Taniguchi as allegedly disclosing the claimed construction except for barrier layer including a chemisorption product. The Office Action relies upon Kim as allegedly disclosing an ALD thin film including a chemisorption product.

However, Taniguchi does not disclose or suggest a barrier layer to oxygen diffusion. Thorough review of Taniguchi reveals that the terms "barrier" and "diffusion" and similar terms do not appear anywhere in the text, evidencing that Taniguchi does not contemplate that aluminum oxide film 8 functions as a barrier layer to oxygen diffusion. Column 2, lines 6-26 of Taniguchi merely describe film 8 as functioning as a reducing layer to reduce silicon oxides formed on the lower electrode prior to depositing film 8 and to forming a Ta_2O_5 dielectric film on film 8. Taniguchi does not in any way identify that the dielectric layer can contain oxygen that is diffusable into the first electrode absent a barrier layer, as set forth in amended claim 36. Further, column 2, line 7 of Taniguchi describes a thickness of 10 to 50 Angstroms for film 8. Thorough review of Taniguchi reveals no disclosure or suggestion whatever that film 8 can have a thickness of less than 10 Angstroms, as set forth in claim 36. Rather, Taniguchi indicates that enough of film 8 must be present on the lower electrode to reduce the natural silicon

oxides and implies a minimum of 10 Angstroms. If film 8 has a smaller thickness, then natural silicon oxides can remain and the method would become inoperable for its intended purpose of reducing natural silicon oxides.

Taniguchi can not be modified to suggest a barrier layer having a thickness of less than 10 Angstroms since no motivation exists in the cited art to support such a modification. The mere fact that the prior art can be modified does not make the modification obvious "unless the prior art suggested the desirability of the modification." In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Accordingly, if a proposed modification of the prior art would render the prior art device or process "inoperable for its intended purpose," then no suggestion or motivation exists to make the proposed modification. Id., MPEP § 2143.01. Film 8 of Taniguchi functions as a reducing layer and thus has a different purpose than the barrier layer of claim 36. The claimed invention of the barrier layer including a chemisorption product of first and second substantially saturated monolayers allows the barrier layer to have a thickness of less than 10 Angstroms. No disclosure or suggestion exists in Taniguchi that the deposition methods for film 8 will provide a reasonable expectation of success in forming a barrier layer to oxygen diffusion at a thickness of less than 10 Angstroms. Accordingly, no motivation exists in Taniguchi to reduce thickness below the disclosed minimum.

The Office Action relies upon Kim for teachings of chemisorption products, however, such reference also does not disclose or suggest a barrier layer to oxygen diffusion having a thickness of less than 10 Angstroms, as

claimed. Kim does not provide disclosure or suggestion of aluminum oxide film thickness except a description in column 6, lines 30-32 of about 10 to 1,000 Angstroms. Further, the aluminum oxide formed in Kim is not necessarily a barrier layer, but is merely a generic thin film. Column 1, lines 11-14 of Kim only describe use of thin films as "a dielectric of a semiconductor device, a transparent conductor of a liquid-crystal display, or a protective layer of an electroluminescent thin film display." None of the described uses constitute an insulative barrier layer to oxygen diffusion.

Notably, neither Taniguchi nor Kim disclose or suggest an insulative barrier layer to oxygen diffusion including a chemisorption product of monolayers and having a thickness of less than 10 Angstroms. Neither reference discloses or suggests a barrier layer to oxygen diffusion. Also, neither reference discloses or suggests a barrier layer having a thickness of less than 10 Angstroms.

It is unexpected in the construction of claim 36 in comparison to the cited art that a thickness of less than 10 Angstroms is desirable. Use of a chemisorption product in the barrier layer to oxygen diffusion allows effective use of a smaller thickness. Taniguchi does not provide any expectation that the disclosed reducing layer will provide usefulness at less than 10 Angstroms. Kim does not provide any expectation that the aluminum oxide thin film will provide usefulness at less than 10 Angstroms. It is thus unexpected to include a chemisorption product in a barrier layer to oxygen diffusion at a thickness of less than 10 Angstroms. At least for the several

reasons described above, amended claim 36 is patentable over Taniguchi in view of Kim.

Claims 37-39, 52, and 54 depend from claim 36 and are patentable over the cited art at least for such reason as well as the additional limitations of such claims not disclosed or suggested. For example, amended claim 37 sets forth that the second capacitor electrode comprises RuO_x. Neither Taniguchi nor Kim disclose or suggest such a composition for the second capacitor electrode which provides oxygen that is diffusable into the first electrode absent the barrier layer, as stated in claim 36. Also, amended claim 52 sets forth that the barrier layer has a thickness of less than about 6 Angstroms. Such range is much less than the minimum thicknesses described in Taniguchi and Kim.

As may be appreciated from the above discussion regarding the deficiencies of Taniguchi in view of Kim as applied to claims 36-39, 52, and 54, Applicant asserts that withdrawn claims 32-35, 40-51, 53, 55, and 56 are also patentable.

Applicant herein establishes adequate reasons supporting patentability of claims 32-56 and requests allowance of all such pending claims in the next Office Action.

Respectfully submitted,

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